

# Explaining Recent Increases in Students' Marijuana Use: Impacts of Perceived Risks and Disapproval, 1976 through 1996

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## Introduction

The past 3 decades have witnessed several dramatic shifts in the rates of marijuana use by young people. The prevalence of marijuana use rose during the late 1960s and throughout most of the 1970s, then declined steadily and substantially throughout the 1980s, only to rise again during much of the 1990s.<sup>1,2</sup> Our purpose in this article is to examine alternative interpretations for these historic changes, relying on national trend data from high school seniors (1976–1996) as well as on more recently available trend data from 8th- and 10th-grade students (1991–1996), all gathered as part of the Monitoring the Future study.<sup>1,8</sup>

Why do some young people use marijuana and other illicit drugs, whereas others do not? There are multiple and overlapping approaches to answering this important question. At one broad level of explanation, we can simply refer to different points in time during the past 2 decades and note very large differences in the popularity of the drug. For example, a 12th grader in 1978 was fully 3 times as likely to be a current marijuana user (defined as any use in the past 30 days) as a 12th grader in 1992 (prevalence rates of 37% vs 12%).<sup>1</sup> Thus, in a sense, we can explain or account for substantial differences in marijuana use simply by knowing the historic period—for example, those who graduated in 1992 were at far less risk of being current marijuana users than those who graduated in 1978.

The question remains, however, as to why marijuana was so much more widely used at some times than at others—why did its popularity fluctuate so much? Efforts to answer that question take us to more fundamental levels of explanation and require us to look at individual-level factors. One approach to explaining individual differences in likelihood of using marijuana (and other illicit substances) is to focus on lifestyle fac-

tors, including academic abilities and commitments as well as fundamental values such as religion.<sup>3,4</sup> Another approach focuses on what might be considered more proximate factors: specifically, individuals' perceptions and attitudes about particular drugs.

Some early analyses indicated that these more proximate factors were closely linked with marijuana use.<sup>5,6</sup> A more elaborate analysis, covering high school senior classes of 1976 through 1986, showed that both approaches (lifestyle and proximate factors) strongly correlated with marijuana use. Seniors who had good grades in school, were never truant, were strongly committed to religion, worked few or no hours at part-time jobs, and spent few evenings out for fun and recreation were far less likely than the average senior to use marijuana or other drugs. Also, seniors who perceived a great risk of harm in marijuana use, or who disapproved of such use, were relatively unlikely to be users themselves. In addition, the analysis showed that lifestyle factors largely overlapped attitudes about drugs, especially disapproval, suggesting that lifestyle variables might operate indirectly with disapproval as intervening variables.<sup>7</sup>

The 2 approaches were not, however, equally useful in accounting for the overall decline in marijuana use among high school seniors during the 1980s. Instead, the analysis clearly showed that changes in attitudes alone could account for the secular changes in marijuana use, whereas other lifestyle factors could not.<sup>7</sup>

In the present article, we extend the work to see whether the earlier conclusions can be generalized along 2 important dimen-

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## ABSTRACT

**Objectives.** Marijuana use among high school seniors increased during most of the 1970s, decreased throughout the 1980s, and has been increasing again during the 1990s. Earlier analyses of the classes of 1976 through 1986 attributed the historic trends during that period to specific changes in views about marijuana. This study examined whether recent increases in marijuana use among seniors and among students in earlier grades reflect similar processes.

**Methods.** Multivariate regression analyses were conducted on data from large annual nationwide surveys of high school seniors from 1976 through 1996 (approximate  $n = 61\,000$ ) and 8th and 10th graders from 1991 through 1996 ( $n$ 's = 87 911 and 82 475, respectively).

**Results.** Individual lifestyle factors (grades, truancy, religious commitment, evenings out for recreation) correlated substantially with marijuana use but did not explain the historic changes in marijuana use. Rather, decreases in perceived risk of harmfulness and in disapproval can account for the recent increases in all 3 grades and for earlier decreases among seniors.

**Conclusions.** These findings indicate that perceived risks and disapproval are important determinants of marijuana use. Accordingly, prevention efforts should include realistic information about risks and consequences of marijuana use. (*Am J Public Health.* 1998;88:887–892)

sions—time (as well as direction of dominant change) and age. We test (1) whether the explanations for the decline in high school seniors' marijuana use during the 1980s apply equally well to the more recent increase in use during the 1990s, and (2) whether the recent increase in marijuana use among 8th and 10th graders might be explained in the same fashion, that is, in terms of shifts in marijuana-related attitudes (perceived risk of harm and disapproval).

## Methods

### *Samples, Survey Methods, and Measures*

The data were obtained from the Monitoring the Future project, an ongoing nationwide study of youth conducted by the Institute for Social Research under a series of research grants from the National Institute on Drug Abuse.<sup>1,8</sup> The project has been conducting annual surveys of high school seniors since 1975 and of 8th and 10th grade students since 1991. The present analyses deal with 21 senior classes (1976–1996; 1975 was omitted because of differences in questionnaire formats) and with six 8th and 10th grade classes (1991–1996).

All surveys consisted of self-completed questionnaires, group administered in schools by locally based Institute for Social Research representatives and their assistants. The 8th-, 10th-, and 12th-grade surveys each involved separate and nonoverlapping school samples (about 130–160 schools each), drawn to be representative of all students in the 48 contiguous states.<sup>1,8</sup>

Student response rates averaged 84% across the senior surveys, 87% across the 10th-grade surveys, and 90% across the 8th-grade surveys, with absenteeism accounting for nearly all nonresponse. If absentees had been included in all surveys, the estimated proportions of marijuana users would have increased by less than 3 percentage points, and trend patterns across years would have been essentially unchanged.<sup>1,9</sup>

Obtained sample sizes for each grade level totaled approximately 15 000 to 19 000 students each year. The senior surveys involved 5 (6 after 1989) different questionnaire forms each year; prior to 1990, items on marijuana risks and disapproval appeared on single forms (each assigned randomly to one fifth of the total sample). Accordingly, most analyses of senior data involved samples of approximately 3000 each year. Exact numbers of cases for each analysis are reported in the tables.

Measures of marijuana use, perceived risks of harm from marijuana use, personal

disapproval of marijuana use, personal background, and lifestyle are described in the earlier report.<sup>7</sup>

### *Analysis Strategy*

Our broad analysis strategy was to carry out multiple regression analyses using 3 sets of predictors, separately and in combination, and then compare predictor sets to ascertain unique and overlapping portions of explained variance. In all instances, the dependent variable was the frequency of marijuana use during the 12-month period preceding the survey.

The analyses used pooled individual data from multiple years, either 21 years (1976–1996) for analyses involving seniors or 6 years (1991–1996) for analyses of 8th and 10th graders (also replicated on seniors). The pooling of data across years simplifies reporting, because we have found that the correlations between marijuana use and the other variables outlined above change relatively little over time.<sup>7,10</sup> A far more important reason for the pooling of individual data across years is that secular trends in the dependent variable—that is, historical changes from year to year in marijuana use—are included and thus are able to be predicted. In other words, by combining individual seniors across 2 decades, we are able to consider the full range of variance in marijuana use during this period, as we contrast different sets of predictors.

*Predictor set A* consisted of a set of background and lifestyle factors shown by previous research to be correlates of marijuana use, other drug use, and various other “problem” or “deviant” behaviors.<sup>3,4,7,11–13</sup>

*Predictor set B* consisted of perceived risk of harm resulting from marijuana use, disapproval of marijuana use, or both.

*Predictor set C* was a derived variable assigned to each individual; it consisted of the nationwide mean marijuana use for the year (and grade) in which the student was surveyed. The correlation between that variable and individual marijuana use is interpreted as reflecting the extent to which individual variance in marijuana use over the total period in question is explainable or interpretable in terms of the overall secular trend in use.

## Results

### *Trends in Marijuana Perceptions, Attitudes, and Use*

The trend data shown in Figure 1 provide a useful background for the multivariate analyses that follow. The left-hand por-

tion of the figure shows trends for high school seniors (1976–1996), the middle portion shows trends for 10th graders (1991–1996), and the right-hand portion shows trends for 8th graders (1991–1996).

The senior trend data show the rise in use ending in the late 1970s, the decline throughout the 1980s, and the resurgence during the early 1990s; moreover, the data show corresponding (i.e., mirror-image) trends in perceived risk of harm and in disapproval. The data for 8th and 10th graders during the early 1990s are similar to those for seniors during the same period; all show steady increases in marijuana use and corresponding steady decreases in perceived risk of harm and in disapproval.

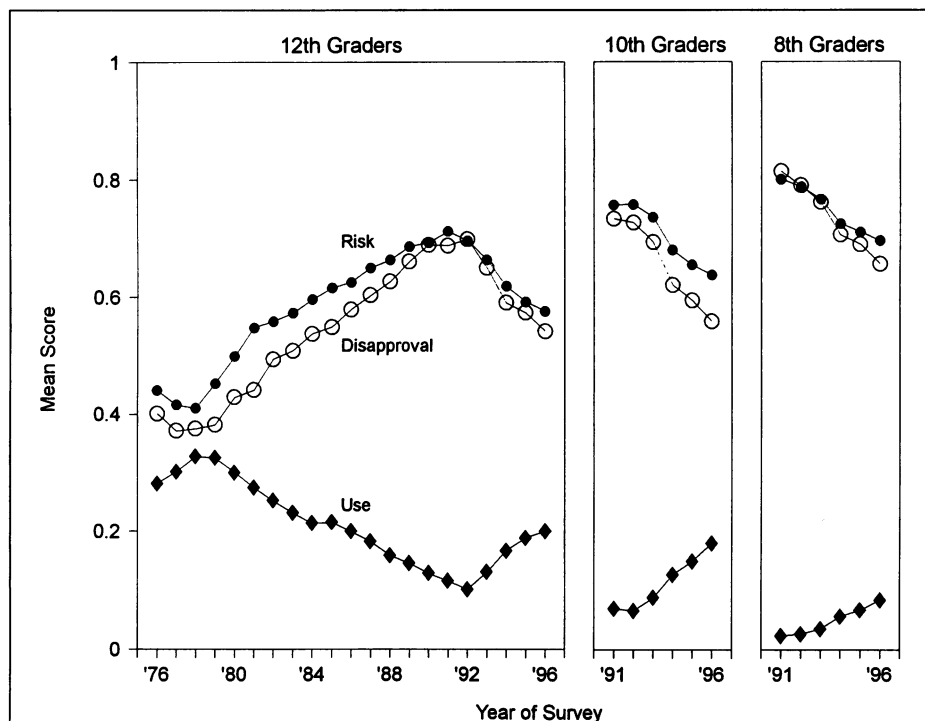
### *Multivariate Analyses of Seniors, 1976 through 1996*

We carried out 2 parallel sets of multivariate analyses using data from high school seniors from 1976 through 1996, following the strategy outlined earlier. The separate sets of analyses were necessitated by the fact that measures of perceived risk of harm appeared on one of the multiple questionnaire forms (form 5), whereas measures of disapproval appeared on another form (form 3). The results involving the disapproval measures are presented in the upper portion of Table 1; those involving the perceived risk measures are in the lower portion.

The left-hand column of Table 1 consists of product-moment correlations. We note in passing that the correlations involving lifestyle variables (set A) and the mean marijuana use measure (set C) are virtually identical for the 2 sets of analyses; trivial differences between the two are attributable to random differences between the form 3 and form 5 subsamples, not to any differential question context effects produced by the 2 forms.

The remaining columns of Table 1 show the results of regression analyses using 4 combinations of predictors. The first of these combined all of the lifestyle variables (set A) as predictors of marijuana use. It can be seen that those seniors who were frequently truant, who spent many evenings away from home for fun and recreation, who got relatively poor grades, and who were low in religious commitment were also more likely than the average senior to be users of marijuana. Combined, these and the other lifestyle measures can account for about 21% of the variance in marijuana use ( $R^2$  values were 0.206 and 0.213).

Turning next to mean marijuana use per year (set C), we can see that the overall secular trend in marijuana use can account



*Note.* To heighten comparability, the perceived risk and disapproval items were rescaled so that the lowest possible score (indicating no risk, or don't disapprove) was set equal to 0 and the maximum possible score (indicating great risk, or strongly disapprove) was set equal to 1. Marijuana use during the previous 12 months was scored 0 for no use, 1 for any use.

**FIGURE 1—Trends in annual marijuana use, perceived risk, and disapproval: high school seniors, 1976–1996; 8th and 10th graders, 1991–1996.**

for a moderate portion of the total individual variance in seniors' marijuana use during the 2 decades under study ( $r = 0.21$ , representing 4.4% of variance).

Did the lifestyle variable and the secular trend effects overlap in their impact on individual marijuana use? The data in the column for sets A plus C, compared with those for set A alone, indicate very little overlap. The regression coefficients for mean marijuana use per year are practically identical to their zero-order correlation coefficients. More importantly, the  $R^2$  values show that sets A plus C can account for about 4% more variance than set A alone. It thus appears that the secular trends in marijuana use are almost entirely orthogonal to any effects of the individual lifestyle factors.

The outcome is quite different when we conduct a similar test using the measures of marijuana attitudes (set B). First, these measures show very strong relationships; indeed, the disapproval measures can account for nearly half of the variance in marijuana use ( $R^2 = 0.485$ ). But the most important finding is that the overall prediction is unchanged with the secular trend data (set C) added to the equation ( $R^2$  for sets B + C remains 0.485). The same lack of any additional secular trend effect is evident for the form 5

data on perceived risk of harm, shown in the lower half of Table 1 (the  $R^2$  value is 0.378 for set B and also for sets B + C). To demonstrate the point more completely, we also compared sets A plus B with sets A plus B plus C (data not shown); the addition of set C increases the  $R^2$  values only trivially (by 0.001 to 0.002).

In sum, these comparisons among sets of regression analyses covering data from 2 decades (1976–1996) support the same basic conclusions as were reached on the basis of our earlier examination of data from the first decade (1976–1986): the secular trends in marijuana use are not explainable in terms of the lifestyle factors included in set A, but the trends could be explained by secular trends in perceptions of the risk of harm from marijuana use, disapproval of its use, or both.

#### *Multivariate Analyses of All 3 Grades, 1991 through 1996*

The annual Monitoring the Future surveys of 8th graders and 10th graders were begun in 1991, so the trend period available for analysis is relatively limited. Nevertheless, this period captured substantial secular trends in marijuana use; for example, annual prevalence among 8th- and 10th-

grade students more than doubled during the past half-decade.

To test whether these recent secular trends in younger students might reflect processes similar to those involved in the 20-year trends among seniors, we conducted multivariate analyses using the 8th-grade data and, separately, the 10th-grade data, following the same analysis strategy. We also carried out parallel analyses for 12th-grade students limited to the same period (1991–1996). We were able to incorporate the perceived risk and disapproval measures in all of these analyses, because the measures were available in the same questionnaires for all 8th- and 10th-grade respondents and for a subsample of the 12th-grade respondents. The results for all 3 grades are shown in Table 2.

Table 2 is similar in format to Table 1, thus facilitating comparisons between the long-term (1976–1996) and more recent (1991–1996) findings for high school seniors. We begin by observing that the basic findings for the most recent period are in many respects very similar to those for the whole 2 decades. Most notably, the lifestyle variables show very similar patterns of relationship.

The central question to be addressed with the data in Table 2 is whether the 1991 through 1996 secular trends in marijuana use are potentially explainable by the lifestyle variables, the attitude variables, or a combination of the two. Here, as before, our strategy is to consider whether the secular trend or “between-years effect” (set C) overlaps with lifestyle differences (set A), attitude differences (set B), or both. The findings show an impressive consistency: across all grades, sets A and C are completely nonoverlapping in their effects, whereas set C adds virtually nothing (0.0% or 0.1% ) to the variance explainable by set B (and set C also adds virtually nothing—0.1% or 0.2%—to the variance explainable by sets A + B, [data not shown]).

The results of these regression analyses permit us to generalize across 8th- and 10th-grade students, as well as high school seniors, in concluding that the recent increases in marijuana use cannot be explained by any sort of shift in more fundamental lifestyle variables, whereas they may be attributable to declines in disapproval and perceived risk of harm associated with marijuana use.

#### *Discussion and Conclusions*

In the analyses reported here we examined marijuana use among secondary school

**TABLE 1—Multiple Regression Analyses Predicting Marijuana Use (1–7 Scale): High School Seniors, Classes of 1976 through 1996 Combined**

Predictor	<i>r</i>	A	B	A + C	B + C
<b>Disapproval (data from questionnaire form 3; n = 61 454)</b>					
<b>A. Lifestyle variables</b>					
Grades	–0.196	–0.098		–0.093	
Truancy	0.330	0.228		0.218	
Hours worked per week	0.107	0.071		0.024	
Average weekly income	0.089	–0.031		0.034	
Religious commitment	–0.229	–0.139		–0.154	
Political beliefs	0.166	0.099		0.097	
Evenings out per week	0.279	0.200		0.189	
Sex (M = 1, F = 2)	–0.097	–0.030		–0.029	
<b>B. Disapproval of</b>					
Trying marijuana	–0.536		–0.062		–0.061
Occasional use	–0.633		–0.224		–0.222
Regular use	–0.673		–0.460		–0.459
<b>C. Mean marijuana use per year</b>					
	0.210			0.208	0.016
<i>R</i>		0.454	0.696	0.496	0.697
<i>R</i> <sup>2</sup>		0.206	0.485	0.246	0.485
<b>Perceived risk of harm (data from questionnaire form 5; n = 60 184)</b>					
<b>A. Lifestyle variables</b>					
Grades	–0.200	–0.098		–0.095	
Truancy	0.338	0.233		0.223	
Hours worked per week	0.111	0.090		0.044	
Average weekly income	0.084	–0.049		0.016	
Religious commitment	–0.224	–0.130		–0.144	
Political beliefs	0.156	0.095		0.091	
Evenings out per week	0.291	0.209		0.199	
Sex (M = 1, F = 2)	–0.106	–0.038		–0.033	
<b>B. Perceived risk of harm from</b>					
Trying marijuana	–0.445		–0.105		–0.104
Occasional Use	–0.555		–0.190		–0.188
Regular use	–0.582		–0.388		–0.386
<b>C. Mean marijuana use per year</b>					
	0.211			0.202	0.011
<i>R</i>		0.462	0.615	0.501	0.615
<i>R</i> <sup>2</sup>		0.213	0.378	0.251	0.378

*Note.* Entries in the first column are product-moment correlation coefficients (*r*); entries in the bottom rows are multiple correlation coefficients (*R* and *R*<sup>2</sup>); all other table entries are standardized regression coefficients. All entries are significantly different from zero (*P* ≤ .05, 2-tailed).

students across the full time range available in the Monitoring the Future data—from 1976 through 1996 for high school seniors and from 1991 through 1996 for 8th- and 10th-grade students. An earlier analysis following the same basic approach dealt only with seniors, covered a time interval only half as long (1976–1986), and focused primarily on the decline in marijuana use that occurred during the 1980s. Although it seemed likely that those earlier findings were broadly generalizable, it is only with the present analyses in hand that we are able to determine that the same broad conclusions apply to the recent period of increase as well as to the earlier period of decrease in marijuana use, and to a wider age range than high school seniors. So there is much that is new in these findings.

One central conclusion to be drawn from all of these analyses is that individual

differences in some of the lifestyle factors we examined are important risk factors in determining which students are likely to use marijuana—or other drugs, for that matter. Indeed, the regression analyses clearly show that these factors can account for much larger differences in marijuana use than can the secular trends during recent years. Thus, although a student in 1989 was less at risk of marijuana use than a student in 1996, and far less at risk than a student in 1979, it is still true that throughout the last 2 decades larger differences in risk of marijuana use lay between those students who were doing well in school and those who were not, or between those who did and those who did not have strong religious commitments.

Another key conclusion is that the lifestyle factors, as important as they are, cannot account for the recent changes in

marijuana use. Young people did not become distinctly more conservative or conventional in the 1980s, nor did they become distinctly less so in the 1990s. The regression analyses reported here indicate that we have to look elsewhere for explanations of the substantial shifts in marijuana use from one year to another.

Where might the explanations lie? The fundamental conclusion that we draw from the present analyses, as well as earlier ones, is that attitudes about specific drugs—disapproval of use and perceptions of risk of harmfulness—are among the most important determinants of actual use. The regression analyses suggest that many of the effects of lifestyle variables occur via disapproval and perceived risk; moreover, the analyses show that all of the secular trends in marijuana use are explainable in terms of changes in these attitudes. So if we want to know why marijuana use is on the rise again, there is little value in asking whether young people are somehow becoming more rebellious or delinquent in general, because the evidence indicates that such is not the case. Rather, we need to ask why it is that they have become less concerned in recent years about the risks of marijuana use, and why they do not disapprove of such use as strongly as students did just a few years earlier.

The answers to such questions go beyond the scope of the data reported here, although we have offered some speculation about possible contributing factors.<sup>14</sup> Recent class cohorts have had less opportunity to learn vicariously about the hazards of drugs by observing drug users in their acquaintanceship circles and among public figures. Also, the decline in marijuana use during the 1980s may have lulled many members of societal institutions (including government, schools, media, and families) into a false sense of complacency about the problem of adolescent drug use. In the early 1990s, news coverage of the drug issue declined precipitously,<sup>15</sup> placement of anti-drug ads declined considerably,<sup>16</sup> and the proportions of parents talking to their youngsters about drugs was low and declining.<sup>17</sup>

Our earlier analyses led us to the conclusion that young people do pay attention to information about the risks and consequences of drug use, especially when it is presented in a realistic and credible fashion, and that the reduction in demand that resulted from the dissemination of such information was the key in the reduction in marijuana use that occurred during the 1980s. The implication for prevention is that presenting such information once does not finish the job; the messages must be repeated lest they be lost from one cohort to the next. □

**TABLE 2—Multiple Regression Analyses Predicting Marijuana Use (1–7 Scale): 8th, 10th, and 12th Graders, 1991 through 1996 Combined**

Predictor	<i>r</i>	A	B	A + C	B + C
<b>8th graders (data from all questionnaire forms; n = 87 911)</b>					
<b>A. Lifestyle variables</b>					
Grades	–0.212	–0.124		–0.130	
Truancy	0.322	0.263		0.262	
Hours worked per week	0.064	–0.008		–0.005*	
Average weekly income	0.147	0.083		0.072	
Religious commitment	–0.161	–0.107		–0.107	
Evenings out per week	0.152	0.083		0.083	
Sex (M = 1, F = 2)	–0.044	–0.001*		–0.002*	
<b>B. Disapproval of</b>					
Trying marijuana	–0.433		–0.041		–0.038
Occasional use	–0.514		–0.117		–0.117
Regular use	–0.549		–0.281		–0.280
Perceived risk of harm from					
Trying marijuana	–0.340		–0.015		–0.013
Occasional use	–0.428		–0.032		–0.033
Regular use	–0.486		–0.222		–0.221
<b>C. Mean marijuana use per year</b>					
<i>R</i>	0.139			0.136	0.036
<i>R</i> <sup>2</sup>		0.391	0.600	0.414	0.601
		0.153	0.360	0.171	0.361
<b>10th graders (data from all questionnaire forms; n = 82 475)</b>					
<b>A. Lifestyle variables</b>					
Grades	–0.240	–0.121		–0.127	
Truancy	0.335	0.247		0.248	
Hours worked per week	0.086	–0.004*		–0.004*	
Average weekly income	0.135	0.049		0.038	
Religious commitment	–0.205	–0.137		–0.134	
Evenings out per week	0.232	0.154		0.151	
Sex (M = 1, F = 2)	–0.062	–0.010		–0.011	
<b>B. Disapproval of</b>					
Trying marijuana	–0.514		–0.026		–0.024
Occasional use	–0.604		–0.171		–0.169
Regular use	–0.632		–0.291		–0.291
Perceived risk of harm from					
Trying marijuana	–0.435		–0.022		–0.021
Occasional use	–0.538		–0.059		–0.058
Regular use	–0.570		–0.224		–0.222
<b>C. Mean marijuana use per year</b>					
<i>R</i>	0.168			0.164	0.038
<i>R</i> <sup>2</sup>		0.427	0.685	0.457	0.686
		0.182	0.470	0.209	0.471
<b>12th graders (data from questionnaire forms 1, 3, and 6; n = 35 645)</b>					
<b>A. Lifestyle variables</b>					
Grades	–0.191	–0.092		–0.105	
Truancy	0.309	0.213		0.206	
Hours worked per week	0.077	–0.003*		–0.002*	
Average weekly income	0.125	0.052		0.044	
Religious commitment	–0.216	–0.121		–0.122	
Political beliefs	0.188	0.118		0.118	
Evenings out per week	0.254	0.177		0.176	
Sex (M = 1, F = 2)	–0.097	–0.039		–0.040	
<b>B. Disapproval of</b>					
Trying marijuana	–0.491		–0.011*		–0.011*
Occasional use	–0.577		–0.154		–0.154
Regular use	–0.600		–0.270		–0.270
Perceived risk of harm from					
Trying marijuana	–0.430		–0.040		–0.039
Occasional use	–0.526		–0.068		–0.067
Regular use	–0.562		–0.247		–0.245
<b>C. Mean marijuana use per year</b>					
<i>R</i>	0.126			0.123	0.018
<i>R</i> <sup>2</sup>		0.432	0.669	0.449	0.669
		0.187	0.448	0.202	0.448

Note. Entries in the first column are product-moment correlation coefficients (*r*); entries in the bottom rows are multiple correlation coefficients (*R* and *R*<sup>2</sup>); all other table entries are standardized regression coefficients.

\**P* > .05; all other entries are significantly different from zero (*P* ≤ .05, 2-tailed).

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## Case Studies in Public Health Ethics

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